BOTANICAL GAZETTE.

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Notes on Carex—VI.

BY L. H. BAILEY, JR.

1. The half-dozen most critical and trying groups of Carices, within the Manual region, may be named as follows: (1) The scoparia group, including CC. scoparia, lagopodioides, cristata and var. mirabilis; (2) C. laxiflora and its varieties, with CC. oligocarpa and digitalis; (3) CC. stricta, aperta and vulgaris; (4) C. straminea and its varieties; (5) C. Pennsylvanica and its immediate allies, CC. varia, Emmonsii and Novæ-Angliæ, and even C. umbellata; (6) CC. aristata, trichocarpa, and the var. imberbis.

2. C. Pennsylvanica and C. varia are apparently distinct. I should define and contrast them as follows:

C. PENNSYLVANICA Lam. *Stoloniferous*, forming large patches: *leaves usually as long as the mostly slender culms* (which are commonly less than ten inches high), *narrow, soft and grass-like: spikes one to three, approximate, usually contiguous* (the two lowest very rarely more than a half inch apart), *globose, all closely sessile, commonly more or less dark colored.*

C. VARIA Muhl. *Not stoloniferous: stouter: leaves broader* (1½ lines to 2 lines), *usually shorter than the more or less prolonged culms* (which are from ten inches to two feet high), *rather rigid: spikes three to five, globose or oblong, scattered* (from ½ inch to 1½ inches apart), *mostly light colored, the lowest often peduncled and commonly subtended by a conspicuous bract.* The very large forms with oblong and peduncled spikes and leafy bracts are taken as the type by Dr. Boott, and the more ordinary forms are referred to var. minor. It appears hardly worth while, however, to make such a division.

3. C. Bebbii Olney I referred to C. lagopodioides in my preliminary Carex Catalog. I have sharp notes from correspondents

who would refer it to C. scoparia. My specimens, from Olney, are large and decidedly like C. lagopodioides, especially in the character of the sheaths. I have seen other specimens which appear to be nearer C. scoparia. It appears to lean strongest towards C. lagopodioides in general habit However, it is immaterial to which species it goes. Enough that it goes. Von Boeckeler makes short work with these species by making C. scoparia a variety of C. lagopodioides.

4. C. lagopodioides Schk. is often slender and very loose-headed northward. These forms are exceedingly puzzling, and they are distributed under a great variety of names. They approach C. cristata var. mirabilis. Olney proposed a varietal name to cover most of these forms, but never defined it. It is an important variety and I subjoin its character:

Var. MONILIFORMIS Olney Exsicc. *Culm slender, especially above, where it surpasses the long-pointed lax leaves: spikes two to ten, small, nearly globular* (usually less than ¼ in. in diameter), *all distinct, the lowest separated, bright straw or rust colored, the points of the spreading perigynia conspicuous.*—Cambridge, Mass., to New Brunswick and Vermont. A very similar form comes from Louisiana. The extreme forms bear little resemblance to the ordinary C. lagopodioides, but they always preserve the loose sheaths and other characters of the species.

5. C. fulva Good., and C. lævigata Smith, have never been found in the United States, so far as I know, since B. D. Greene collected them at Tewksbury, Mass. They were probably chance introductions and should be dropped. C. fulva occurs in Newfoundland, however. In fact, the original specimens were collected there. C. extensa Good., credited to Long Island in the Manual, also occurs, or did occur in 1870, near Norfolk, Va. (*McMinn.*) The same collector also found there the European sand Carex, C. arenaria L. It is singular that so few Carices become naturalized. So far as I know but six European Carices are naturalized in this country: C. præcox Jacq., C. acutiformis Ehrh. (C. paludosa Good.), C. extensa Good., C. hirta L., C. glauca Scop. (in Canada), C. muricata L., and probably also C. panicea L., and C. leporina L

6. C. straminea is remarkable from the fact that all its varieties are connected with the type by a complete series of gradations. The individuals of these intermediate forms are also common. The extreme form of the species is var. alata (C. alata Torr.) The type of this variety has heavy, conical, greenish spikes which are peculiarly striking. The intermediate forms

are more common than the type, however. For a half way form Olney proposed the name var. pseudo-straminea. So also the peculiar var. silicea (C. fœnea var.? sabulonum of the Manual) with its nodding culm passes directly into the species. The type of the variety grows in loose sand on the sea beach. A little inland its culm is erect and the plant often counterfeits var. chlorostachys Beklr. (C. fœnea Willd.). I am now growing plants of this variety here at Lansing to see what effect an inland habitat will have. I have found a very near approach to this variety on Lake Michigan. Var. chlorostachys holds its characters the best of all the forms of the species, although there is great difficulty in disposing of a quarter of the specimens one receives. Its strongest union is with var. alata. So far as I know, this variety does not get far away from the Atlantic and Gulf borders, unless it be in the upper Canadian provinces. C. fœnea var.? ferruginea of the Manual is midway between the type of C. straminea and the var. tenera Boott. I was misled by numerous specimens, which I supposed to be authentic, to refer var. tenera to the species in the Carex Catalog. The plant designated by Prof. Dewey as C. tenera is well worthy a varietal recognition, however. It is not the plant which is commonly taken to be var. tenera. I should designate the variety as follows: *Culms nodding at the top: spikes four or five, heavy, globular or broadly conical, all separated, bright tawny or rusty.* Commonly confounded with forms of C. scoparia. An important character of the representative stramineas is the stiff culm which surpasses the very long-pointed leaves. I am satisfied that much of C. cristata, var. mirabilis belongs with C. straminea, and the rest of it with C. cristata and C lagopodioides. There are no characters in it which are not also in one or all of these three species. It needs either to include more forms or none at all. I am planting a caricetum in which to study the sedges as they grow.

7. Mr. H. N. Patterson has collected C. misandra R. Br. (C. fuliginosa Sternb. & Hppe.) in Colorado this summer. It appears to be new to the United States. It is distinguished from C. frigida All., its nearest ally, by its *ovate or club-shaped spikes, androgynous terminal spike, and slender peduncles which are exserted from loose, colored sheaths.* It was named from Arctic American specimens. The C. fuliginosa of Schkuhr is the same as the older C. frigida All. Sternberg and Hoppe misapplied Schkuhr's name to the plant now designated C. misandra, supposing that they had Schkuhr's species. C. fuliginosa of Stern-

berg and Hoppe is therefore the oldest name of C. misandra, although the plant was first recognized as distinct when Robert Brown named it C. misandra. Under the circumstances it appears that Brown's name should stand.

The Study of the Parasitic Fungi.[1]

BY T. J. BURRILL.

It needs no argument to show the practical value of the studies undertaken upon these minute—probably degraded—members of the vegetable world, for they subsist on living plants of the higher orders, upon which our domestic animals and ourselves depend for the means and materials of physical existence. It is not, indeed, usually known or suspected what proportion of our crops and useful vegetation is destroyed by the microscopic growths which live as parasites or saprophytes upon them; but when we come to understand that in very great measure the things called "blights," "mildews," "rusts," "smuts," "rots," "ferments," etc., are really due to the despoliations of these same microscopic but multitudinous forms of fungi, some appreciation can be gained by any one, even with a moment's thought, of the immense aggregate loss that occurs. Perhaps, in one sense, it is well that cultivators do not fully realize the number and variety of parasitic growths which await the development of their valuable plants, and which are liable so badly to injure the latter, and so seriously to affect the receipts for expended labor. Surely, in many cases, there would be sufficient ground for discouragement and hesitation to venture in opposition to such an array of dangerous enemies, against whose insidious and covert attacks fighting seems futile.

But knowledge of the existence of such things can not make that existence more hazardous, nor the results more distressing; while here, as in the other battles of life, to be forewarned is to be forearmed. Knowledge is power, and as much so in this case as in any other; if the latter is still wanting, it is only because the former has not been attained. Is it attainable? There are difficulties in the way. The objects are very minute; we can not see them by the unaided eye as individuals, we can not thus watch their modes of dissemination, germination, growth and development; we only see them, if at all, in the mass, and know of their

[1] From Bull. Ill. State Lab. Nat Hist., Volume II.

presence by their results. They have singular, and, to the students of other forms of life, unfamiliar physiological powers and properties; they assume peculiar disguises, and pass through unlooked-for stages of development, of which the connecting links are hard to make out; they lie dormant now, and again become wondrously quickened and enormously multiplied under circumstances not readily traced. But little by little, qualified observers have acquainted themselves with their existence as true species, veritable and distinct plants, and little by little have learned something of the mysteries of their life histories. Sometimes the advance in knowledge is gained by casual and lucky observations; but mostly by painstaking, systematic research, aided by all the appliances of the equipped laboratory and the fruitful skill of trained powers of manipulation and acute perception. A step gained is not only so much secured, but renders more possible other or further advance. The more becomes known, the easier progress is made, since that already acquired points the way towards new achievements. The beginning has been made, though this can scarcely be said to have been true until within very recent times. The men are now living and working who have made known all the ascertained facts of physiological processes and results in these parasitic fungi. The germination of fungus spores was not observed until within the present century.

During the last part of the first half of this century learned discussions arose upon the specific distinctions between the parasite and the host, and esteemed botanists held the view that what was taken for the former was but a diseased condition of the latter—the rust of wheat, for example, was only the degraded cell-tissues of the wheat itself. Such difference of opinion, however, no longer exists among those who have possession of the information now acquired. The tissues of higher plants do not change by any processes of degradation or transformation into the things called fungi, and neither do the latter originate in any other manner than as descendants of preëxisting parent forms through as rigid specific lines as can be traced among any animals or plants. It is known, too, that however much the fungus is formed within the tissues of the host plant, it began its growth outside of the latter and gained introduction only by forcible entrance. Spores are never taken up by absorption and carried by aqueous currents from part to part of the plant. The fungus passes through the tissues very much as roots pass through the soil, sometimes apparently without in any degree successful opposition, sometimes nearly or quite baffled in the struggle by the mechanical and physiological resistance of the host plant.

A Botanical Tramp in North Carolina.

BY GERALD M'CARTHY.

Of all the districts the Washington botanist has to choose from, the amphibious section along the Atlantic coast, southward of Norfolk, including the great Dismal Swamp, is the most interesting, especially in its summer flora.

Having decided to collect in this region, June 22, 1884, found me at Norfolk, Va., with a store of drying paper and presses prepared to

> "Botanize for summer months three,
> Maugre the doughty mosquito and all that with him might be."

Norfolk is a most malodorous town and an excellent place to avoid at this season of the year. Some good sedges are found hereabouts, but as my visit was too early for them I secured scarcely anything worth mentioning.

The next morning found me aboard the small steamer "Newbern" bound across Carrituck and Albemarle Sounds, for the Alligator River and Lake Mattamusket, in Hyde county, North Carolina. The course of the steamer lay so far from these points, however, and transportation was so difficult to procure, that I found it expedient to change my plans somewhat, and to begin with the Tar River country of North Carolina. The port at the mouth of Tar River, whither our steamer was bound, proved to be a straggling, untidy town of some 2,000 inhabitants.

The Tar River, so called, I presume, from the large amount of pine tar which is floated to market on its waters, is a good sized stream, as yellow as the Tiber from the clay brought down from its head waters. The country on both sides of the river resembles that bordering on the lower Potomac, and the two floras have many things in common. Here, however, we find the dominating *Taxodium distichum*, with its accompanying parasite *Tillandsia usneoides* hanging in mossy festoons from the scantily foliaged branches. Its light gray color contrasting with the sombre hue of the cypress gives to the country the appearance of having but recently emerged from a Noachian bath—a suggestion that seems to be well borne out by the superabundance of water everywhere present.

The Magnolias, both *glauca* and *grandiflora*, flourish luxuriantly. The handsome *Cyrilla racemiflora* is very abundant in the

swamps; as is *Gordonia Lasianthus*, and *Stuartia Virginica*, which vie with the Magnolias in the gorgeousness of their blooms. *Clethra alnifolia* is everywhere, and loads the air heavily with its perfume. *Callicarpa Americana*, *Itea Virginica*, *Physostegia Virginica*, *Nesæa verticillata*, *Asclepias pauperula*, *Mikania scandens*, and the Carolina Rose, are the most common of the smaller plants. In the water are found *Nymphæa tuberosa*, *Nelumbium luteum*, *Nuphar advena*, *Pontederia*, and *Sagittaria*. *Sorghum Halapense*, *Arundinaria macrosperma*, *Tripsacum dactyloides*, *Zizania aquatica*, and a small variety of *Elymus Virginicus* are the principal grasses. *Scirpus pungens*, *S. lacustris*, *Carex glaucescens*, *Scleria triglomerata*, and *Dichromena leucocephala* and *D. latifolia* are abundant, though my visit was rather too early to get good specimens of any of them.

I kept a sharp look-out for *Dionæa muscipula*, but failed to observe it, though I afterward found it at a point about forty-five miles distant. The insectivorous plants are well represented by *Sarracenia purpurea*, *S. flava* and *Drosera longifolia*.

The mistletoe, *Phoradendron flavescens*, is quite abundant, but appears to have a decided partiality for shade trees along the principal streets of the towns.

This village, in common with most others of this wet district, was suffering from a plethora of shade. The streets are usually lined with wide spreading gums, whose branches often form leafy arches over the street on one side and over the roofs of the low-built houses on the other, shutting out the health-giving sunshine. The roofs become moss-covered, and the bed-rooms are pervaded with dampness. Can any one marvel, then, that ague, rheumatism, and malaria should be the scourge of this section? The trunks of these trees are invariably open, exposing the hollow, blackened interior; their boughs are usually knotted into fantastic, and often weird shapes, and from many abraded swellings ooze drops of amber gum.

GENERAL NOTES.

Poisonous Plants.—1. *Cicuta maculata*, L. Paul was a healthy and strong boy of fifteen years, living at Duck Creek, Brown county, Wisconsin. While making a bridge over a small creek on his father's farm, with his younger brothers, one day about the middle of June, he ate the whole root and the lowest part of the stem, about four inches in length, of a young and large water-hemlock. He tried to induce his brothers to do the same, as it tasted like turnips. They, however, only chewed bits of the root and spit them out. Paul

soon felt sick at the stomach, and after drinking some water vomited the whole poisonous meal, as his brother afterward stated. He become worse, lay down on the grass, and his sister was called, who twice gave him a small portion of milk, freshly drawn from pasture cows. But the third time the patient was no longer able to take the tin can used for milk-pan; unconsciousness and lockjaw had set in. He was carried home and died shortly after, although a physician was promptly called. The death occurred within seven hours after eating the plant.

The writer of this went some days afterward to the place and learned the facts as stated here, and identified the deadly poisonous plant as water-hemlock (*Cicuta maculata*, L.).

2. *Pastinaca sativa*, L., one of our most appreciated vegetables, has a bad record as "wild parsnip," growing frequently along ditches, roads, and hedges. In the year 1878, an employe of the Northern Wisconsin Railroad died from eating parsnips, rooted up by himself from a ditch. His wife, who refused the meal, preserved her life, but his two children and the hired girl could only be saved from death by a physician's aid. I was told of this by an acquaintance of the family, and it was also so stated by the newspapers. Two other fatal accidents, near Depere, Brown county, Wisconsin, were reported in the papers about two years ago, by which several persons lost their lives from eating wild parsnips. The matter is important, and serious enough to call especial attention to this plant and its effects.—J. H. SCHUETTE, *Green Bay, Wis.*

Galium verum in New York.—If Dr. Gray's mention, in the Manual, of Essex County, Massachusetts, as the only station of *Galium verum*, except its occasional occurrence among ballast plants, be not supplemented by later reports, it may be of some interest that the plant is well established here. Three years ago I found a single tuft on the farm of Mrs. Phœnix Bockée, near "The Separate," in the township of Stanford, Dutchess county, New York. Now, although limited to a single field, a pasture with thin limestone soil, it grows there in great masses of a rod or more in diameter, filling all the surrounding air with its heavy fragrance.—MARTHA BOCKÉE FLINT, *Amenia, N. Y.*

Littorella lacustris, L.—A new locality for *Littorella lacustris* is worth recording. Macoun's Catalogue gives three stations, one in Ontario, one in Nova Scotia, and one on Lake Champlain. I find it along the southern shore of Lake Utopia, Saint George, New Brunswick, where it flowers when the water is lowest, about the middle of August.—J. VROOM, *St. Stephen, N. B.*

EDITORIAL NOTES.

REV. E. L. GREENE has been appointed instructor in botany at the University of California.

A BOTANIC GARDEN has been established at Reikjavik, Iceland, which will undoubtedly introduce many valuable economic plants to the attention of the islanders.

PROF. JOHN M. COULTER has been appointed State Botanist of Indiana, a position with more of sound than substance, but looking towards better things.

DR. XAVER LANDERER, professor of botany at the University of Athens, Greece, died July 19.

M. E. JONES, of Salt Lake City, Utah, distributed lately a list of some 1,300 species of plants, collected by him during 1884, from Texas to California, which he has for sale.

A LARGE ILLUSTRATED WORK on the flora of France, by H. Baillon, is announced. It is to be issued in forty or fifty parts, with ten colored plates each. The price is moderate.

IN THE OCTOBER *Nuovo Giornale Botanico Italiano*, O. Mattirolo presents a paper on the development of the seed-coat in the genus Tilia, accompanied by three most excellent plates.

JOSEPH F. JAMES has a paper on "affinities of the genus *Dionæa* Ellis," and one on "progress of vegetation in the Ohio valley," in the Journal of the Cincinnati Soc. of Nat. Hist. for July.

WE LEARN FROM THE *West American Scientist* that the care of the Engelmann herbarium, which is to be deposited in the Shaw Botanic Gardens at St. Louis, has been offered to Dr. C. C. Parry.

THE AMERICAN NATURALIST for October contains a most excellent resumé, by Professer Bessey, of the botanical portion of the A. A. A. S. at Ann Arbor, and of the proceedings of the Botanical Club.

PROFESSOR TRELEASE has recently treated of the "spot disease of strawberry leaves (*Ramularia*)" and "when the leaves appear and fall," in the second report of the Wisconsin Agricultural Experiment Station, and of grape rot in the transactions of the Wisconsin Horticultural Society.

DR. C. ROUMEGUÈRE, editor in chief of the *Revue Mycologique*, has been made a commander of the Royal Military Order of Christ by His Majesty Don Louis I., King of Portugal. It is a great and unusual honor to be bestowed upon a botanist, and one who has devoted his whole life to science.

THE LAW OF MICHIGAN now requires two bulletins a year from each department of its Agricultural College. Several have already been issued, including one from the botanical department, on "vitality of seeds," and one from the horticultural department, on "fruits, vegetables and trees."

THE SYNOPSIS of the genus Selaginella, by J. G. Baker, is concluded in the October number of the *Journal of Botany*. It is accompanied by a complete, and hence invaluable index. This paper has extended over three volumes of the journal, and has described 312 species, 105 of which are described for the first time.

THE SEVENTH FASCICLE of a magnificent work on the forest flora of Cochin-China by L. Pierre, director of the botanic garden of Saïgon, has just been issued. The plates are 40x65 cm. and sometimes double. The work is published by the French government, under the auspices of the Minister of Marine and the Colonies.

PROF. EDOUARD REZEL, the director of the Imperial Botanic Garden at St. Petersburg, celebrated the 70th anniversary of his birth the 13th of last August. A great number of his friends and collaborators joined in celebrating the day.

THAT THE MICROPHYTES have wonderful powers of resistance is shown by the recent experiments of Professor McKendrick, of Glasgow. Attempts were made to destroy organisms like bacteria by cold, instead of heat. Temperatures of 120° below 0° F. were applied, but when thawed the fluids contained living organisms still.

F. C. LEHMANN, who has spent over ten years in tropical America, has returned to his labors, after a short visit to Europe to arrange for the elaboration and publication of the results of his extensive collecting. He will make his headquarters at Popayan, United States of Colombia, and especially investigate the conditions of plant distribution.

THAT WE NEED some popularized information on the subject of parasitic fungi is shown by a recent editorial note in a leading horticultural paper which says, in reference to the new work entered upon by the Agricultural Department, that, "Prof. Trelease has been engaged to work up the diseases of plants, and Mr. Scribner to work up the microscopic plants.

AN EAR OF RICE pop-corn, sent to the New York Agricultural Experiment Station, as a new variety, under the name of Bear's Paw, was peculiar in being flattened in a fasciated manner. Four hills were planted and thirteen ears grown, of which twelve showed fasciation like the original. It is, to all appearances, the transmission of a malformation.

THE CULTIVATION of barley in Iceland, which was discontinued about the middle of the fifteenth century, has been resumed under the auspices of the government, and with full success. The reason it has not been carried on in recent years is evidently not due to the increased cold of northern regions, as usually maintained, but to the fact that cattle raising was more profitable.

HACKEL, in his monograph of the European species of Festuca, maintains that the histological characters of the leaf are of great diagnostic value, even for closely related varieties and forms. Of the various tissues the sclerenchyma offers the best characters, and the epidermis comes next, while the mesophyll and fibro-vascular bundles are quite uniform and worthless for this purpose.

DR. G. L. GOODALE returned on the 26th of September from a brief stay in Germany, whither he sailed about the first of August. He went chiefly for recreation, but visited a few of the chief laboratories. A conference with Mr. Carl Zeiss will result in the production of a cheaper and more convenient dissecting microscope, a large number of which have already been ordered for the botanical laboratory at Cambridge.

PROFESSOR D. P. PENHALLOW has treated of the distribution of the reserve material of plants in relation to disease in the *Canadian Record of Science* for October. He uses the peach tree as an illustration, and shows, *inter alia*, that a relation exists between the amount of starch deposited in the bark and the

quantity of potash in the ash. An unhealthy tree, presumably suffering from the yellows, has more starch and less potash.

THE LABORATORY NUMBER (December) of the GAZETTE is meeting with much encouragement from our principal laboratories and many private workers. We would ask every worker, whether in a laboratory or not, to send to us descriptions of any devices, simple or otherwise, he may value in his work. All kinds of suggestions are desired, such as any botanist would like to obtain from his fellows. We do not desire to omit any laboratory, public or private, and if this is done, the failure must not be laid to our charge.

IN THE *American Naturalist* for November, L. P. Gratacap gives the results of some experiments upon the growth of plants watered with acid solutions. Without giving any of the many interesting details of the work, the general conclusion reached is that "the action of acid upon soil containing growing plants is to increase the mineral constituents of the latter, and that slightly acid waters percolating through a pulverulent soil richly provided with comminuted and impalpable matter would assist its introduction into plants needing these elements.

ON THE 18th of this month Dr. Asa Gray completes three-quarters of a century of his life. Few botanists can show so many years of botanical activity, and certainly none have been of such uninterrupted and illustrious service in the cause of botanical science in this country. His career, reaching back into the very beginnings of American botany, is still at the very zenith of its usefulness. The grip upon North American plants, which only many active years can bring, renders his recent work and the work yet planned of very great importance, and American botanists are very earnest in their hope that many years may yet elapse before his busy brain and pen cease to work for us.

WE WOULD CALL the attention of our readers to the fact that the General Index for the first decade of the GAZETTE is being prepared, and will be a most exhaustive one. Every species mentioned, every subject (not only formal ones, but also those incidentally referred to), every author, all with abundant cross references, will be given. It is the intention, in short, to place in the hands of botanists an index which will put at their finger tips all the information which the BOTANICAL GAZETTE has contributed for ten years. This index will only be sent free to subscribers to Volume XI, and as only a limited edition will be printed, it is necessary for subscribers to be prompt in sending their names. For particulars our advertisement on the second page of the cover may be consulted.

MR. HEMSLEY'S report on the insular floras collected by the Challenger Expedition is one of great interest, for the questions suggested by insular floras are often very puzzling. It is upon these islands, too, that the native flora is being sadly interfered with, and where it is very peculiar, as in the case of St. Helena, a complete knowledge of it can not be obtained too soon. In fact, four recorded and peculiar species have already entirely disappeared from the island mentioned, and others are rapidly approaching extinction. St. Helena and the Bermudas are taken as presenting the two types of insular floras; the former

very ancient and very distinct, and its origin very uncertain; the latter entirely resembling that of neighboring islands and continents. It is stated that not even a well marked species would be lost if the Bermudas were submerged.

MR. G. MURRAY, in his annual reports as Inspector of Fisheries in England and Wales, gives some interesting accounts of the inoculation of fishes with *Saprolegnia ferax*. The cultivation of this fungus was carried on with flies as hosts, and inoculations were effected by rubbing the head or sides of the fish with an infected fly. Experiments were mostly made upon species of the Salmonidæ. Some experiments were very successful, others not at all so; in the former cases the fungus appearing and death following promptly. In one case, where the disease broke out in a fish tank, it was found that oospores of Saprolegnia had been conveyed to the fishes by the earth-worms used as food, and that the worms had obtained them from moist ground upon which had been thrown the bodies of diseased fishes. Afterwards another fungus, *Dictyuchus*, appeared in the cultivations and entirely displaced *Saprolegnia*, the latter rapidly and completely disappearing.

MUSHROOMS are coming to the front, and information concerning them may soon be broadcast enough in this country to bring within the reach of our people a very palatable, cheap, and abundant food. Dr. Rothrock has recently lectured upon this subject, in the Fairmount Park series of lectures. After describing a number of nutritious and dangerous fungi, the lecturer said: "There is a point to be insisted upon, that as fungi, which were edible and delicious and nutritious, are probably more abundant here than in Europe, where they are an important article of food, it is in the interest of the community that every one should know them. Every public school should have, where every child could see them, plaster models, life size and color, of the edible and the poisonous species. This idea could easily be realized, and would involve almost no expense, whilst its practical benefits would be larger than we can at present conceive of. Even the Chinese government prints and distributes broadcast over the land what is known as the Anti-Famine Herbal, a book describing nearly 500 species of plants which in time of scarcity may be utilized as food. Are we still to remain in this respect below these, whom we consider barbarians?"

A RECENT PAPER[1] by M. Leclerc du Sablon on the dissemination of the spores of vascular cryptogams may be briefly summarized as follows: The structure of the sporangium is quite similar in plants of the same family. In Equisetaceæ the sporangium presents the same structure as in a large number of Phanerogams (e. g. Borrago, Iris). It is composed of "spiral" cells, and it is to the difference between the contraction of the pure cellulose of the wall and the lignified cellulose of the spiral that the rupture is due. The movements of the spores after they are set free are due to the difference in the contraction of the lignified and non-lignified parts of their appendages. The dehiscence of the sporangium is explicable on the same principle, but is made pos-

[1] Ann. des Sc. Nat. Sér. 7, tome ii, p. 5. July, 1885.

sible by a different arrangement of the lignified parts. Here the external walls of the epidermal cells are composed of pure cellulose, while the internal and lateral walls are lignified; the external face of the cells, therefore, will contract more. The dehiscence of the sporangium of Ferns is characteristic and and unique. The different movements effected by the cells are due to the variation in pressure produced by the dryness of the air in the interior of the cells. The opening of the sporangium is therefore not due to the contraction proper of the cell-walls. In all three groups of vascular cryptogams the determining cause of the rupture is the same, viz: the dryness of the atmosphere.

In *Flora* for September 1st, J. Schrodt commences a paper on a similar subject, "Das Farnsporangium und die Anthere; Untersuchungen über die Ursachen des Oeffnens und Umrollens derselben."

Prof. William Trelease has published, with plate, a resumé of his observations on several Zoogloeæ and related forms in the Johns Hopkins series of Biological Studies. The following note as to his method of culture is interesting to workers: "At first various starchy substances were employed as media for the growth of the different species, but I finally restricted my cultures to boiled potatoes carefully cut in halves, the exposed face being inoculated in one or more points by means of a needle scrupulously fired before and after each inoculation. These were kept in sauce-plates, under inverted tumblers, some of which were not disturbed until the end of the culture, while others were opened from time to time for microscopical study or for material to be used in starting new cultures. It is needless to say that many of these failed through the introduction of other germs in one way or another; but by means of frequent transfers, pure cultures of all ages were kept under daily observation for about three months:"

CURRENT LITERATURE.

Parasitic Fungi in Illinois: Part I, Uredineæ. From the Bulletin of the Illinois State Laboratory of Natural History, vol. II, pp. 139–255. By T. J. Burrill, Ph. D. Peoria, 1885.

The first striking feature of this work is its size, for although embracing but a single order as illustrated in one State only, it requires, exclusive of the preface, over one hundred and fifty octavo pages for the enumeration. Eighty-two true species and forty-seven imperfect forms are described. The recent catalogue of the parasitic fungi of Wisconsin gives sixty five true species and thirty-four imperfect forms of Uredineæ, and that of Iowa gives seventy-nine true species and fifty-five imperfect forms. It is plain that the parasitic fungi are receiving marked attention, and the rusts in particular. Much credit for the size of the Illinois list is due Professor A. B. Seymour, now of the University of Wisconsin, who collected two seasons under the direction of the State Laboratory, and who has remarkably keen powers of observation.

Each species of the list is amply described, the localities for each host plant cited, some synonymy given and notes often appended. The whole is preceded by a key to the genera and followed by a glossary and index of species and host plants. The work throughout shows evidence of thorough and critical study, and is a very valuable contribution to American mycology. The labor on the synonymy is especially commendable. The author is cautious

and yet judicious. He does not follow Dr. Winter in tracing back to æcidial or varietal names in case these occur, as introducing too great an element of uncertainty, but adopts the more conservative plan advocated by Dr. Farlow. There is much to be said in favor of this, and it will undoubtedly tend to give greater stability to our nomenclature for the present at least. The author also emphasizes the desirability of always writing the authority for the whole name, and not merely the authority for the specific part of it, as is now too common among many mycologists. The basis of the nomenclature used is summed up as follows: (1) the use of the oldest specific name known to have been used for the species as such, (2) the name of the teleutospore and uredospore stages are alone considered in the question of priority, and (3) the name of the author responsible for the specific appellation has been appended, being enclosed in parenthesis in case the generic association has been changed, and the name of the author of the binomial combination, whether the parts were adopted from others or not, finally follows. Out of the eighty-two true species, a dozen have their æcidial forms described along with the other stages.

An admirable plea is made for the more thorough investigation of the parasitic fungi as of great economic importance. This portion would be valuable and interesting reading to the majority of intelligent cultivators.

Physiological Botany: Part II. Vegetable Physiology. By George Lincoln Goodale, A. M., M. D., Professor of Botany in Harvard University. 8°. pp. 195–499; together with *Practical Exercises*, pp. 36. New York: Ivison, Blakeman, Taylor & Co. 1885.

Since the publication of the first part, the appearance of the concluding portion of this work has been eagerly looked for by the teachers and students of botany in this country. It will at once occur to the reader, as he lays down this volume, that here is a really new book; not new in its facts, of course, but essentially new in the arrangement, and thoroughly original in the presentation of them. On further consideration, he will be impressed with the very wide range of literature from which these facts have been gathered, and he will be thankful that the author has not been content with a mere mention of the name of the observer, but has given copious references to the literature, and in many cases a citation of the passage in point. This will certainly prove very helpful to teachers and their pupils alike—helpful to the former, because it will save the time otherwise spent in hunting up these scattered papers for more valuable work; and helpful to the latter, because it will impress upon them that there is much knowledge which could not be put into a five hundred page book.

The reader will also be impressed with the comprehensiveness of the treatment. One can hardly mention a topic in vegetable physiology which is not elaborated or touched upon. No one can look at the table of contents without noticing at once the number and variety of the topics and their very logical arrangement.

Of all the chapters in the book, perhaps the one on assimilation may be said to the most thorough and satisfactory. An excellent distinction is insisted upon between assimilation proper, or the appropriation of carbon and its combination with hydrogen and oxygen, and assimilation as meant by animal physiologists. There is likely to arise confusion unless such a distinction is observed.

It is gratifying to find the subjects of geotropism, heliotropism, *et id omne genus*, cut off with the brevity that our ignorance concerning them demands, for an explanation that does not explain, only serves to mystify.

The subject of fertilization, however, hardly receives due attention, though other phases of the reproductive processes are well treated. It ought to be pointed out here that Strasburger, in a later work (Neue Untersuchungen, Oct., 1884), corrects his statement quoted on p. 435 as to the union of one of the synergidæ with the oösphere. (See BOT. GAZ. ix. 328.)

The illustrations in the second part do not compare favorably with those in the first. The figures of the structure of the pollen grain and the embryo sac are much too small for clearness, and some of the figures of apparatus are quite coarse.

The practical exercises, which form a separately-paged appendix to the volume, will serve a good purpose in the laboratory work of the student. They contain many valuable hints as to material for study, and enumerate the more important physiological experiments that can be performed by a skillful manipulator in a well-equipped chemical and physical laboratory, including also a large number which require only a little skill and less apparatus.

The second volume of "Gray's Botanical Text-Book" is a worthy companion to the first one by Dr. Gray himself.

Report on the Flora of Western and Southern Texas. By Dr. V. Havard, U. S. A. From Proc. U. S. Nat. Museum. Sept. 23–30, 1885. pp. 85.

Since 1880 Dr. Havard has been stationed at several posts, and has also accompanied several exploring expeditions in Western Texas. His report is divided into two parts. Part I discusses the vegetation in the general way, under the following heads: general view; rainfall; temperature; valleys; valleys east of the Pecos (Concho, Colorado, Brazos, Red River); the Pecos; valleys west of the Pecos; the Rio Grande; hills, bluffs, and mesas; staked plains; prairies; coast; mountains; salt lakes basin. Part II is made up of economic notes on the plants known to have useful or baneful properties, or to be of value to agriculture or industry. Altogether, it is a careful and pains-taking report, and forms a valuable contribution to our knowledge of the botany of a very interesting region.

The Mycologic Flora of the Miami Valley, Ohio. By A. P. Morgan. From the Journal of the Cincinnati Soc. Nat. Hist. 1885.

There are before us three papers, a continuation of the Mycologic Flora of the Miami Valley, in which Mr. Morgan displays much hard work, and work that can hardly help giving an additional impetus to the study of western mycology. They comprise by far the larger part of Order II, Polyporei, of the Hymenomycetes, and have been delayed in their distribution until the completion of the bulky genus Polyporus. This genus, like the genus Agaricus of the Agaricini, includes most of the Order. A short paper will contain the remaining six genera.

The paper on Polyporus is the first attempt to give a systematic account of the species of any region of the United States. The Polypori, unlike the fleshy Agarici, are mainly leathery or woody plants, on which account they are easily preserved and have been liberally sent abroad by collectors. The native American species, therefore, have been chiefly named from the dried specimens, and the consequence is an extensive synonymy, which it will take a long time yet to clear up.

The species of Polyporus, in these papers, are presented in the arrangement of Fries, in the second edition of the *Epicrisis*, this answering almost as well for them as for the European species, and not in the arrangement of the *Nova Symbolæ* of Fries, which would probably be necessary for a full account of the Polyporei of the United States.

Of the eighty-six species, thirty-four are not found in the Epicrisis, and are therefore practically inaccessible to the ordinary student. Fifty-two species, therefore, are identical with European forms, while thirty-four are native; of the latter, however, several are found in other lands. Seven of the species were first found in the Miami Valley, by Mr. Lea, and published in the Cincinnati Catalogue in 1849; and although Mr. Morgan's researches have doubled Mr. Lea's list, he has been able to add but three new species.

Mushrooms of America—Edible and Poisonous. By Julius A. Palmer, Jr. Prang & Co. Boston [1885]. Chart or Roy. 8°. pp. 4. 12 col. plates.

Although the author, in his first sentence, disavows having prepared the work for botanists, yet the several hundred botanists of this country will surely take as great an interest in it as the general public. It is an admirable and much needed work, intended to introduce the novice to a number of common edible mushrooms, and to warn him of some poisonous ones. It is lamentable that one can not gather mushrooms for the table indiscriminately, but as this can not be done, it is some consolation to learn that, although abundant in individuals, there are comparatively few really deadly species. Four of the most common of these are illustrated, together with six others which are to be avoided. The remainder of the work embraces a dozen and a half edible species. Almost everyone will recognize some old acquaintances among them, and regret that their value as food had not been known long since.

Although mushrooms are plants, they have the comestible qualities of flesh, and to some extent may replace this costly article of diet. The Société Mycologique, of France, devoted to diffusing a better knowledge of the value of mushrooms for food, has a few members in this country; but a work like the present is a strong additional agent for obtaining the same result. The certain recognition of the different kinds is essential to securing and maintaining popularity. All that word and picture can do toward this is here furnished. The plates are naturally and artistically colored with the skill which has brought Prang & Co. deserved fame, and the text is simple and accurate. Under each plate is a description of the species, in which it has only been necessary to use seven words requiring definition, no one of these having more than six letters. Following the description is the recipe for cooking.

The work is issued in three forms: as a chart for the wall, loose sheets in a portfolio, and bound in book form. It is to be hoped that it will meet with sufficient sale to warrant the publishers in continuing the work, as they express a willingness to finally illustrate most of the larger North American mushrooms.

Recherches Anatomiques sur les organes vegetatifs de l'Urtica dioica L. Par A. Gravis. 4 to. pp. X. 256. 23 plates. Bruxelles. 1885.

This is a most elaborate work, and the plates, as is usually the case in European monographs, are beyond all praise. The author has not only studied anatomically the species mentioned, but all its relatives, so that the labor involved a pretty thorough examination of the order. To give some idea of the care taken, the author states that over 15,000 sections of *Urtica dioica* alone were made, in view of which fact, who will soon dare to contradict the results? M. Gravis is strongly of the opinion that anatomical and embryological characters will furnish the same useful basis of classification among plants as it has already done among animals. His criticism of previous anatomical work among plants, however, is that certain regions of a certain age have been examined, to the entire neglect of other regions and other phases in development. Accordingly in the case of *Urtica dioica* the author treats of the stem, the leaf, and the root, and in each case has made an exhaustive study of the tissues from the first appearance of these organs to their completest development, no region being neglected. The tracing of the fibro vascular bundles into and through the nodal regions, and the working out of the leaf structures from the cotyledons on, are especially fine. The contribution is not only a pleasure and a help to those who like good work, but also a very good lesson to the many who seem to think they can learn all about the anatomy of a plant from a few sections.

GRAY MEMORIAL VASE.